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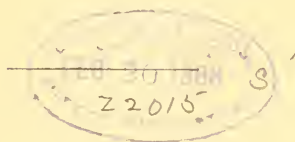
THE CHEMISTRY OF MINERAL TANNAGES.

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THE
CHEMISTRY OF MINERAL TANNAGES

BY
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PRINCETON, N. J.



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THE CHEMISTRY OF MINERAL TANNAGES

During the last few years the manufacturers of morocco have made great changes in their output. There is little demand at present for the old styles of sumac tannages, "Brush Kid," "Pebbles," &c., but the newer styles of mineral tannages with a glazed finish are largely called for by shoe manufacturers, and gentlemen in the morocco trade are now striving to supply this demand. Although there are about as many different kinds of Glazed Kid on the market as there are manufacturers, still these may be grouped into five classes.

1. Gambia and Alum Tannage. Many manufacturers are devoting their attention to this with success. The skins are placed in a vat, with a wheel, which contains the tanning liquor, where they are allowed to remain about two days. The tan varies in composition very much; some use most all gambia with a little alum, while others use most all alum with a little gambia. The skins after being tanned are fat liquored, dried out, moistened, shaved, staked, blacked, and finished either dull or glazed.

2. India Tanned Stock cleansed, retanned and finished into glazed kid; this is largely turned out in the vicinity of Boston.

3. Sumac Tanned Stock softened, staked, fat liquored and finished into dull and bright stock. This tannage has been brought to great perfection in Wilmington, Del.

4. Straight Alum Tannage which as turned out in this country is in many respects equal if not superior to the imported stock.

5. Chromate Tannage, a beautiful new tannage very recently placed upon the market and in many respects superior to all.

The last two are strictly mineral or chemical tannages, and while a knowledge of chemistry is not essential to success, still a correct understanding of the chemical properties and relations of the materials used, cannot fail to be of advantage and as I find that just such information is desired at present, I have prepared this little pamphlet in which I have explained, as far as I am able, the chemistry of Mineral Tannages and at the same time called attention to my preparations which are expressly manufactured for these tannages and which are now used by many of the leading manufacturers in the country.

To describe these tannages in detail:—

The skins are first soaked in large wooden tubs for three or four days until they are thoroughly and uniformly softened. They are then milled when they are ready for the

LIME.

Liming lasts about 10 days to two weeks. The skins are first placed in old limes for five days and then in a fresh lime, prepared by taking 1 lb. to every four skins, for about five days or until the hair yields readily to the pressure of the thumb.

Lime is soluble in water at 60° Fah. only to the extent of 1 part in 778. It decreases in solubility at higher temperatures. At 212° Fah. (boiling), it takes 1270 parts of

water to dissolve 1 part of lime. Owing thus to its limited solubility an excess of lime, if well slacked, is wasteful rather than injurious to the skins.

The action of lime on skins is a solvent one ; the cells of the epidermis swell up and soften and the hair sheaths are loosened and dissolved. The fibres swell up and absorb water and become differentiated into finer fibrils so that the skin becomes plump ; in this manner breaking up the skin and exposing the fibrils and preparing it for the tan. It also acts upon the fat of the skins, converting it more or less completely into an insoluble soap, and so hindering its injurious effects on the after tanning process and on the finished leather. If strong acid is used further on in the process for plumping the lime soap is decomposed and the grease again set free.

Red Arsenic (Suphide of Arsenic), is frequently added to limes in which stock is placed to be finished into Glazed Kid. This if used in small quantities and judiciously is a good thing,—it hastens the unhairing and gives the grain a higher gloss.

The various preparations which are sold, and many of them patented, to unhair and to be added to limes almost all depend upon Sulphur in some form.

These preparations merely render the lime more soluble and of course the time taken is lessened, but the lime penetrates the skin to such an extent that in spite of frequent washings it remains there and causes much subsequent damage.

It must be said, however, in this connection, that a small quantity of lime left in a skin is not considered by some injurious when the skin is subsequently tanned in alum, in fact it helps to set the alum in the skin in this

way. It combines with the sulphuric acid in the alum and forms Sulphate of Lime and Oxide of Alumina which is insoluble. Expressed in symbols the reaction is $\text{Al}_2(\text{SO}_4)_3 + 3\text{CaO} = \text{Al}_2\text{O}_3 + 3\text{Ca SO}_4$, but this sulphate of lime is undesirable to have in the skins. After liming the skins are unhaired and then placed in the

“BATE.”

Dog pure is almost universally used for this purpose, 1 bushel to about 30 dozen skins. The skins after being unhaired and washed are thrown into an old bate where they are allowed to remain a few hours; they are then removed and placed in a new bate where they remain over night.

In this the skins completely lose their plumpness and become soft and slippery, the lime is largely neutralized and the dirt, grease and fine hairs work out of the skins freely when they are subsequently slated. The theory of the action of the bating process is somewhat obscure. Some attribute its action to the effects of the salts of ammonia, while no doubt the salts of ammonia do neutralize the lime, but when they are used alone they do not have the desired effect of softening the epidermis and properly preparing the skins for the tan. In fact, as Proctor has pointed out, the process is a fermentive one. The active bate swarms with bacteria and to this fermentive or putrefactive action, rather than to its chemical constituents the action of the bate must be attributed.

That manufacturers should still continue to use this disgusting substance is extraordinary. This is no doubt due to the fact that the men in charge of this process of bating from long experience are perfectly familiar with the properties, action and effects upon skins of dog pure. And also to the fact that the various substitutes introduced to the trade, owing to a misconception of their originators, as to what was required of a bate, did not accomplish what was desired.

If the above theory is correct, a “Bate” to be effective must neutralize the lime, and also reduce the skin until it

becomes soft and slippery, and also so act upon the epidermis that the pores are thoroughly opened, so the dirt, grease, and fine hairs work out freely upon the beam, leaving the skins thoroughly cleansed and in perfect condition for tanning, or, I should say, to absorb the mineral salts to which it is subjected. This my "New Solid Bate," which I have recently originated, thoroughly accomplishes. It has a mild fermentive action on the skins and develops in the bate vat weak organic acids which neutralize the lime in a perfectly safe way; it also reduces the skins, opens the pores of the epidermis, and thoroughly accomplishes all that is required of a bate.

Its other advantages over dog pure are

1) It is solid, dry and compact in bulk (100 lbs. to a cubic foot), but little space is required for storage. Charges for transportation are low.

2) It is all packed in neat 4-lb. paper boxes, so marked that pounds and half pounds may be cut off without bother of weighing.

3) It is clean, and develops no offensive odors, unaffected by thunder-showers or other atmospheric changes.

4) It quickly desolves in water, does not require watching while in use, as its action is regular and always the same.

5) It contains all the operative and useful properties of the old bate, but is free from odor and injurious useless ingredients, such as sand, dirt, etc., which constitute about nine-tenths of all dog pure. One case (100 lbs.) of new Solid Bate does the work of 75 bushels of dog pure.

DIRECTIONS FOR USE.

1 lb. of New Solid Bate is sufficient for 20 dozen skins.

1) Take a clean barrel, remove the head and place a spigot in the side about six inches from the bottom. Place the barrel in convenient proximity to bate vats.

2) From the package shave with a knife the desired quantity into a bucketful of warm water. Rub these shavings under water between the thumb and finger until dissolved (it will not injure the hands in any way).

3) Pour this into the barrel which has been filled about half-full of warm water, stir well and allow to stand at least twenty-four hours.

4) Draw off nearly all the contents of barrel and pour into the warm water of the abating vat, stir well, and put in skins, which have been washed after unhairing.

5) Prepare more bate as before, for the next day, and so on.

6) When the hides are removed from the abating vat, run off nearly but not quite all of the old bate liquor.

It will be noticed that no change in the usual factory arrangements are required in using my "New Solid Bate." All bates work best in pools or tubs in which there is a wheel. Many puresmen do not run off the liquor from the abating vat but freshen it up from day to day with new bate. If this method is pursued, the contents of the abating vat should be well stirred up and about one-third drawn off every day and warm water and fresh bate solution added. In this manner the same bating solution can be used for several weeks.

Price of "New Solid Bate," 40 cts. a pound, all packed in 4-lb. paper boxes; 25 of these in 100-lb. cases. One 4-lb. package free by express, \$1.50.

For skins which are to be alum tanned, the bating process is omitted altogether.

After the skins come from the bate and have been worked on the beam, they are then placed in a

BRAN DRENCH.

About 30 lbs. of bran is taken for 20 dozen skins. The bran covered with water, allowed to ferment, and the skins placed in this. In Germany they rely on bran exclusively to remove lime from the skins and properly prepare them for the tan. Also manufacturers of straight alum tanned stock in this country. The action of the drench is to still further "bring down" a skin, and remove the last traces of lime. Skins are sometimes "run" in the drench, but this happens very seldom. It is important during the warm weather to obtain bran free from all adhering particles of flour, because bran, when it ferments, produces lactic acid which produces the desired result, while flour when it ferments produces butyric acid, which is apt to injure the stock. For skins to be subsequently tanned with chromates the bran drench is omitted altogether. After coming from the drench and being washed, the skins are now ready for the tanning process. We will first consider

ALUM TANNAGE.

The skins are tanned in a drum with a paste. This paste consists of alum, salt, flour and egg yolk, and sometimes oils of various kinds, as well as sulphur and other materials.

ALUM is a double salt (sulphate of alumina and sulphate of potash) and is but sparingly soluble in water; 1 part of alum to 18 parts of water. Skins have a very strong affinity for alum, so much so, that a skin will extract from the water the last traces of it. Now as the sulphate of alumina in the alum alone tans, the sulphate of potash being of no value, it would seem that sulphate of alumina, which can be obtained for about the same price as alum, taking into consideration its stronger tanning powers, would be better to use in the tanning mixtures than alum. This is no doubt the case, and many manufacturers are using sulphate of alumina in preference to alum. It possesses the practical advantage of being much more soluble than alum and also makes stock softer.

Acetate of Alumina is used in France instead of alum, although to my knowledge it is not used at all in this country. It has the disadvantage of being more expensive than either alum or sulphate of alumina. It does not separate in the skin, it is claimed, in a crystalline form, and the leather never becomes spotted. The skins which are tanned with the Acetate of Alumina, are much more solid than when tanned with alum. I think this substance is well worthy of trial.

SALT.—The effect of salt is peculiar. It does not seem to enter into combination with the skin, but its presence is very necessary. Skins tanned without salt are very hard. The function of salt no doubt, is to increase the diffusion of

the alum solution and to precipitate the coriin which prevents it from gluing the fibres into a hard mass when it dries. In tanning mixtures about half as much salt is used as alum.

FLOUR is used in the tanning mixtures to attain a certain fullness and plumpness. It is the gluten in the flour which accomplishes this result—as it has been ascertained that the finished skins contain no starch. There is a waste product called “Gluten Meal,” which contains a much larger proportion of gluten than wheat flour does, and which costs considerably less. No doubt its merits will soon be called to the attention of the trade. In tanning mixtures use about three times as much flour as alum.

EGG YOLK.—It has been found that Egg Yolk has a remarkable softening effect on leather, and it is largely used for this purpose, notwithstanding it being so costly.

Egg Yolk contains water, 52 per cent.; fat, 30 per cent.; vitelline, 16 per cent.; inorganic salts, 1.5 per cent.; cholesterin, 0.42 per cent.

In fact it is a dense emulsion of oil suspended in water. Vitelline consists of 25 per cent. of albumen, and 75 per cent. of fats, also 1 per cent. of sulphur. Three-fourths of the fats present are oleine and margarine. Cholesterin is contained in small quantities in various parts of the animal system, as the bile, brain, nerves and blood.

Now certainly the water and albumen are of no value, and the fats present or “Oil of Egg” have no particular virtue. The value of egg yolk consists, not in any special constitution of the oil, but on account of the fats being so finely divided.

In order to obtain the best results, the Egg Yolks should be fresh and not stale. The use of the so-called barreled Egg Yolk, which is full of salt, water, and other adulterations is not recommended. In this connection, I would call your attention to my "Egg Yolk Substitute," which is compounded in accordance with the results of the above recent and accurate analysis of Egg Yolk. This preparation is used in the tanning mixtures in exactly the same manner and same proportions as Egg Yolk, and has a wonderful softening effect upon leather. Price, 10 cents a lb; put up in 5, 10 and 20 gallon kegs, and by the barrel.

This preparation may also be used as a fat liquor, by mixing it with from 7 to 8 times its bulk of water.

The above four ingredients are all that is necessary to use, to obtain the best results. Some manufacturers, however, use oil in their tanning mixtures, to gain as they suppose, additional softness and to save egg yolk. Where oil is used, it should be most thoroughly incorporated with the other ingredients. This is accomplished by first mixing thoroughly the egg yolk and flour together with a little water and then adding the oil drop by drop, mixing and stirring thoroughly all the time. Then add the alum and salt, which have been previously dissolved in water, slowly stirring and mixing all the time. Lastly, dilute with water to the proper consistency.

SULPHUR.—Some parties use this substance in their tanning mixtures. They maintain it imparts an additional softness to their leather, and assists in "fastening" the tan-nage in the stock. This last it undoubtedly does to a small extent. It has this undesirable effect, however, it so clogs up the pores of the skins, that they require about twice as

much drumming to get the tanning paste in the stock when it contains sulphur.

After the skins have been drummed with the above described tanning mixture for a hour or so, till it is thoroughly absorbed, they are taken out, hung on hooks, and dried out as soon as possible. Heat should be used to assist the drying process as an alum-tanned skin must be dried out quickly to produce the best results. When the skins are dried out they should be laid away for some time, from 4 to 6 months. This "sets the tannage" and softens the stock. For if the skins are brought at once to the coloring table some of the tannage will be washed out. If it is desired to proceed at once to finish the skins, some process must be employed to "set the tannage," that is to so act upon the tannage that it will be insoluble in water and so not be washed out on the coloring table. The tannage, where either Alum or Sulphate of Alumina is used, is Sulphate of Alumina, as the Sulphate of Potash in the alum has no tanning properties. Sulphate of Alumina is Oxide of Alumina combined with Sulphuric Acid ($\text{Al}_2(\text{SO}_4)_3$). In order to set this tannage it will be necessary to bring into contact with the Sulphate of Alumina some substance which has a stronger affinity for Sulphuric Acid than Oxide of Alumina has, and so take away the Sulphuric Acid from the Oxide of Alumina and leave only Oxide of Alumina in the skin which is insoluble in water. The term affinity or chemical affinity is used to describe that particular power or force, in virtue of which, union, often of a very intimate and permanent nature takes place between two or more bodies in such a way as to give rise to a new substance. It is a general law that bodies most opposed to each other in chemical properties have the

strongest affinity for each other and evince the greatest tendency to enter into combination. Acids are drawn towards alkalies and alkalies towards acids, while union among themselves rarely if ever takes place. It will be seen from the above, as Sulphuric Acid is a very strong acid that bringing an alkali in contact with the Sulphate of Alumina will remove the Sulphuric Acid and accomplish the desired result. But it will not do to use too strong an alkali such as potash or soda, as the strong alkalies would combine with the oil of the egg yolk and remove it from the skin. Now when the tannage has been set, either by letting the stock lay away, or in the manner indicated above, and they have been shaved they are ready to be brought to the coloring table. There is one point omitted, however, the backs or flesh side of the skins are colored either yellow or blue. The yellow color is produced by drumming the skins for a short time with a decoction of gambia, fustic or quercitron bark. The blue color is made by the use of anilines or logwood. Suitable anilines for this purpose can be procured from dealers in aniline colors.

When the skins are on the coloring table they are first subjected to an application of stale urine; this cuts the grease from surface of skins and also acts as a mordant. This primitive method is still pursued, but the use of this disgusting and offensive material is quite unnecessary.

My "New Clean Sig" is a perfect substitute. This preparation is a clean, dry powder; keeps perfectly when stored, and is always ready for immediate use. It is designed to render unnecessary the use of the usual sig in tanneries, often difficult to procure in sufficient quantities, and always very offensive. It works well, cleans the surface of the skins perfectly, also acts as a mordant, and

gives a thorough preparation for logwood or other mordants and black. It gives great satisfaction to manufacturers of Dongola and alum-tanned leather, which sometimes is so hard to color.

DIRECTIONS.

Dissolve the powder in warm water and apply in the usual way. The strength must depend somewhat upon the character of the stock. Use from $2\frac{1}{2}$ to 3 oz. to the gallon, according to the character of the stock, its greasiness, &c.

Price—25 cts. a lb. All packed in pails holding from 25 to 30 lbs. No charge for package. Sample 5 lbs. sent prepaid to any address for \$1.50.

For Alum and Chromate stock order white "Sig," other tannages, yellow "Sig."

Next the skins are treated to a decoction of logwood, prepared by boiling logwood chips in water. It is best to use nothing but water to boil these logwood chips. Some add soda or a little urine, but this is apt to produce not such a clear and satisfactory black. Fustic chips may be boiled with the logwood to advantage. Next a black or "striker" is applied and the quality of this is of the greatest importance. While a black made from pure cider vinegar and iron gives the best results on sumac stock, this kind of a black is not suitable for glazed kid. The black should form with logwood a deep prussian blue-black color and be free from any harshness and any tendency to make the grain tender.

My Standard Iron Liquor Black which is expressly prepared for this purpose, gives the very best results and although it has been on the market, but a short time is

used by many of the leading manufacturers of glazed kid in the country. It is free from vinegar and contains no copperas, blue stone or anything of that kind. It is carefully manufactured from the best materials by exact rule, and tested before sending out, so absolute uniformity may be secured. In fact the trade may rely upon each barrel being exactly like all others. It is a soft black, sets well and quickly, does not strike through, the color is deep prussian blue-black, strong and lasting, will take a bright polish or glaze, and remain soft while stored.

DIRECTIONS.

For a "striker" dilute $\frac{1}{2}$ with water and use in the ordinary way, without any additions. But one grade is made, double strength. Sold by the barrel, 15 cts. per gallon net.

After the application of the striker, the skins are at once washed off with water, dried, staked, and some "Seasoning" rubbed on the surface of black, which is allowed to dry in.

Seasonings are prepared in various ways. Some albuminous substance is generally taken, such as Egg White, Blood, Milk, &c., and mixed with logwood "black," glycerine, gums of various kinds, soap, starch, dextrine, gelatine, alcohol, ammonia water, and various other substances. Berberry wine is also used as a "Seasoning." It is well in preparing these "Seasonings" to remember that it is not well to coagulate the albumen used. Egg White is the most sensitive in this respect, and when it is heated or any acid brought in contact with it or alcohol, it becomes coagulated and the quality of the "Seasoning" much impaired. I manufacture "Seasonings" suitable for the various tannages, to order.

After the skin is dried, the skins are placed under the glazing machine, and when the gloss has been brought up, removed, and lastly oiled off. This "oiling off" is to convert the prussian blue body black to a jet black. But oil applied to an alum skin at this stage, is not at all beneficial, in fact injurious. I have therefore prepared a black which is applied in the usual way, which at once gives a rich jet black, and requires no oiling off. This I call Glacè Black, price 50 cents a gallon.

CHROME TANNAGE.

We are indebted for this tannage, to several German chemists and investigators, Heinzerling, Cavelin, Vanderstraaten and others; to workmen from Germany, who have brought valuable secrets with them, and to a Mr. Schultz who has a patented process for tanning, by means of Chromates. It has long been known that the Salts of Chromium have a strong affinity for Gelatine, and therefore tanning power. But it is not until very recently that this tannage has been made a commercial success.

All the Salts of Chromium are effective as well as Bichromate of Potash, or Magnesia and Chromate of Ammonium, Aluminum and Iron.

But so far manufacturers have confined their attention to Bichromate of Potash.

The skins after being prepared as previously indicated are thrown into a drum with bichromate of potash, dissolved in water, and a little muriatic acid. Schultz directs for 100 lbs. of skins, 4 lbs. of bichromate of potash, and 1 lb of muriatic acid.

The muriatic acid is used for the purpose of plumping the skins, and also serves somewhat the same function as salt does to an alum tannage. That is, it increases the diffusion of the bichromate solution, and also precipitates coriin in the skins, preventing it from gluing the fibres together into a hard mass. After the skins have been drummed in the above mixture with a suitable amount of water for about an hour, it will be found that the tan has struck through the skins and they have absorbed pretty much all the bichromate; they are then taken from the drum. The next process is to set the tannage. The tannage in this case is Bichromate of Potash $K_2Cr_2O_7$, that is

Oxide of Potash K_2O combined with Chromic Acid Cr_2O_6 . Now to "fix" this tannage, it is necessary to convert this Chromic Acid Cr_2O_6 to Chromic Oxide Cr_2O_3 . In order to do this it will be necessary to bring in contact with it some substance which has a strong affinity for Oxygen (O), and take away three parts of the Oxygen (O), thus changing Cr_2O_6 (Chromic Acid) to Cr_2O_3 (Chromic Oxide).

This is accomplished by Sulphurous Acid (SO_2) evolved from Hyposulphite of Soda ($Na_2S_2O_3$) by Muriatic Acid (HCl) which forms part of Schultz' process; or by Sulphuretted Hydrogen Gas (H_2S), a process which I originated; or by the use of Chloride of Barium, Acetate of Lead, Soap Solutions, Gelatin, and various other methods.

With the exception of the first two mentioned methods the substances named merely set the tannage on the surface of the stock. This will not do. Every particle of the Chromic Acid present must be reduced to Chromic Oxide or the stock will be hard after drying out from the fat liquor.

For 100 lbs. of skins which have been treated with 4 lbs. of Bichromate of Potash and 1 lb of Muriatic Acid, Schultz prescribes 10 lbs. of Hyposulphite of Soda, and $2\frac{1}{2}$ lbs. of Muriatic Acid. The Hypo. is dissolved in a suitable amount of water and the acid slowly added, when the following change takes place:

$Na_2S_2O_3$ (Hyposulphate of Soda) + HCl (Muriatic Acid) = SO_2 (Sulphurous Acid) + S (Sulphur) + Na_2O (Oxide of Soda) + HCl (Muriatic Acid).

Thus we have Sulphurous Acid which is given off as a gas with its peculiar characteristic pungent odor, Sulphur which separates out as a yellowish white powder and Oxide of Soda, which remains in solution as well as Muriatic Acid.

When the Bichromate tanned skins are added to this the Sulphurous Acid takes away the excess of oxygen from the chromic acid, leaving chromic oxide in the skins and forming Sulphuric Acid. In this manner $K_2Cr_2O_7$ (Bichromate of Potash) + SO_2 (Sulphurous Acid) = $K_2Cr_2O_3$ (Oxide of Potassium and Chromium) + H_2SO_4 (Sulphuric Acid.)

The sulphurous acid does its work most thoroughly and finished stock, which has been worked with this method, may be placed for some time in boiling water without extracting any of the tannage. But the process is open to serious objections. By setting the tannage in this manner not only are the skins subjected to the action of sulphurous acid, but they are also brought into contact with Sulphuric Acid and Oxide of Soda, as has been explained above, as well as to Muriatic Acid. Now the action of these substances is injurious, and no doubt accounts for "cracking" and other undesirable features.

Setting the tannage by means of "Sulphuretted Hydrogen Gas" (Caveat filed). The skins are tanned in the same manner as stated above by using 4 lbs. Bichromate of Potash and 1 lb, of Muriatic Acid to each hundred weight of skins. Then in any suitable apparatus for the development of Sulphuretted Hydrogen Gas, Sulphide of Iron and water are placed and a little Sulphuric Acid. The Sulphuretted Hydrogen Gas (H_2S) will at once be given forth, it is led by means of a glass tube through water to cleanse it from all impurities and finally into some vat, tub or other convenient receptacle about half full of water in which the skins are placed. The Sulphuretted Hydrogen Gas will at once act upon the Chromic Acid and reduce it to Chromic Oxide in this manner:

$\text{K}_2\text{Cr}_2\text{O}_7$ (Bichromate of Potash) + 4 H_2S (Sulphuretted Hydrogen Gas) = $\text{K}_2\text{Cr}_2\text{O}_3$ (Oxide of Potassium and Chromium) + 4 S (Sulphur) + 4 H_2O (Water) Here we have no superfluous acids liberated to crack the grain of the stock, only Sulphur and water which are quite harmless.

But there is some difficulty in working this process which will have to be overcome before it will be of practicable value. Sulphuretted Hydrogen Gas is but sparingly soluble in water. One part of water will only hold in solution 1 part of Sulphuretted Hydrogen Gas while it holds 50 parts of Sulphurous Acid. The practical effect of this is that in the case of Sulphurous acid the water holds such large quantities in solution that it quickly penetrates to all portions of the skins and accomplishes its work, while in the other case much Sulphuretted Hydrogen Gas escapes into the air without doing its work and causes what to some is a very offensive odor. This difficulty *i. e.* the limited solubility of the Sulphuretted Hydrogen Gas, will have to be overcome before this process is practicable.

After the tannage is set the skins should be removed and at once thoroughly washed to free them from acids and then "fat liquored."

This process of fat liquoring and preparing the fat liquor is most important and does not receive the attention, as a rule, that is requisite to produce the best results.

The best "fat liquor" is the oil which is worked out of skins prepared for glove leather, and I am informed that some parties have gone to the trouble and expense of soaking damaged, and refuse skins in oil, and then working the oil out again. But the usual method is to "cut" some oil, say neatsfoot, sperm, or olive, with a little soda,

and mixing it with eight to ten times its bulk of water. In order to make the best fat liquor, the oil should be in as fine a state of subdivision as possible. My "Egg Yolk Substitute" is strongly recommended for this purpose, it has a remarkably softening effect upon leather.

The skins are taken from the fat liquor immediately to the coloring table before they are dried out and blacked in the same manner as has been previously described for alum-tanned stock. They are then colored blue, if desired, on the flesh side by means of anilines or logwood and hung up to dry. When dry they are taken from the hooks, shaved, staked and finished in the same manner as alum tanned stock.

The materials which may be used to tan leather for glazed kid are endless in number. The Ferric Salts of Iron have strong tanning properties and no doubt some method which utilizes these materials will be the next process used by the trade.

PRICE LIST.

I would state for the benefit of those who have never dealt with me before, that I guarantee all my preparations to be exactly as represented, in so far, that should there be any complaint, I will refill the order gratis or refund the money paid. The prompt shipment and safe arrival of goods is also guaranteed.

"New Solid Bate," substitute for dog pure, cheaper and more cleanly. 1 lb. abates 20 dozen skins. Packed in 4 lb. paper boxes, 25 of these in 100 lb. cases. Price, 40 cts. a lb.

"Egg Yolk Substitute," a perfect substitute for the yolk of egg. Price, 10 cts. a lb. Sold by the barrel and in 5, 10 and 20 gallon kegs.

"New Clean Sig," in form a dry powder, $2\frac{1}{2}$ to 3 oz. dissolved in a gallon of water, is the proper strength to use. Price, 25 cts. Packed in 5, 10 and 20 gallon kegs and in barrels. For alum and chromate tanned stock order white "Sig," other tannages, yellow "Sig."

"Standard Iron Liquor" (Black) used either as a tray black or striker. Double the strength of vinegar black, 15 cts a gallon, packed in barrels.

"Glacè Black" has the good qualities of "Standard Iron Liquor," with the additional virtue that it requires no "oiling off." Price, 50 cts. a gallon.

PREPARATIONS FOR BRUSH KID, PEBBLES AND SUMAC STOCK.


"Bleaching Tan Sweetener" keeps tan liquors at all times perfectly sweet, makes stock a better and lighter color. 2 quarts sufficient for a vat at the start and a small quantity every other day, about a pint. Sold by the barrel, 25 cts. a gallon.

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